

Case Report

Nerve injuries after gunshots pellets

Saly H. Elkholy

Department of Clinical Neurophysiology, Faculty of Medicine, Cairo University, Egypt
E-mail: elkholsaly@yahoo.com

Abstract

This study is an overview of the severity of nerve injuries that could be happened after gunshots pellets. This is a retrospective case study; 6 male patients attended the clinical neurophysiology unit, at Kasr Al Aini Hospitals, Faculty of Medicine, Cairo University, Egypt between February 14th and March 28th 2011 with different types of limbs' nerves injuries due to gunshots pellets. All had multiple pellets either in the upper (3= 50%) or lower (3= 50%) limbs. Some pellets were surgically removed and some are still inside with different pass. All the lower limb injuries are from the back. The upper limbs' are variable but restricted to the hand and forearm. Severity and multiplicity of nerve injuries after gunshots pellets have unpredictable results. They depend mainly on the distance between the weapon and the victim as well as the direction of the weapon. Therefore, international regulations of using gunshots pellets must be more firm.

Keywords: Nerve injuries, gunshots pellets, nerve conduction studies, limb injuries, electromyography.

INTRODUCTION

Although frequently considered harmless, pellet air gun and blank cartridge pistols can produce severe visceral injuries (Morgan et al., 1984; Teke et al., 2009), serious eye injuries (Sevel and Atkins, 1978) and nerve injuries. The type and severity of injuries depend on; the type of weapon used, the distance between the weapon and the victim as well as the direction of the weapon. The tissues through which it travels also play an important role (Shanon and Feldman, 1991).

The orbital pellet injuries has, unfortunately, poor prognosis. A pellet passing through the floor of the orbit often causes double perforation of the globe and, once in the orbital aperture, it travels towards the apex as a result of the conical shape of the orbit and lodges in the optic canal or its entrance severely damaging the optic nerve. Surgery or other treatments are usually unsuccessful. Even if the globe is intact, vision is usually severely impaired (Kükner et al., 2010).

Most of the literatures depend on hospital documents of air gun injuries in children. These accidental injuries are restricted to severe eye injuries and at a lesser extent serious visceral injuries. Pellets Nerve injuries are not be present in such domestic cases, however, they are usually seen after riot control.

In this retrospective study, one tries to highlight the severity of nerve injuries that could be seen after pellets gunshots.

METHODS

This is a retrospective case study. 6 male patients attended the clinical neurophysiology units; 4 at Kasr Al-Aini Hospital and 2 at Kasr Al- Aini New Teaching Hospital, Faculty of Medicine, Cairo University, Egypt. The patients were attending the units with different types of limbs' nerve injuries between February 14th and March 28th 2011.

RESULTS

The age of patients ranges between 16 and 35 years with mean of 23.67. All the patients have been injured on January 28th 2011. 3 patients (50%) were presented with right hand affection and 3 (50%) with right foot drop.

All patients had multiple pellets. Some pellets were removed surgically and some are still inside with different pass. All the lower limb pellets are from the back. The upper limbs' are variable but restricted to the hand and forearm.

Case presentation (chronologically)

Case No. 1: Male, 35 years of age presented with right wrist drop. He had multiple pellets in his right forearm

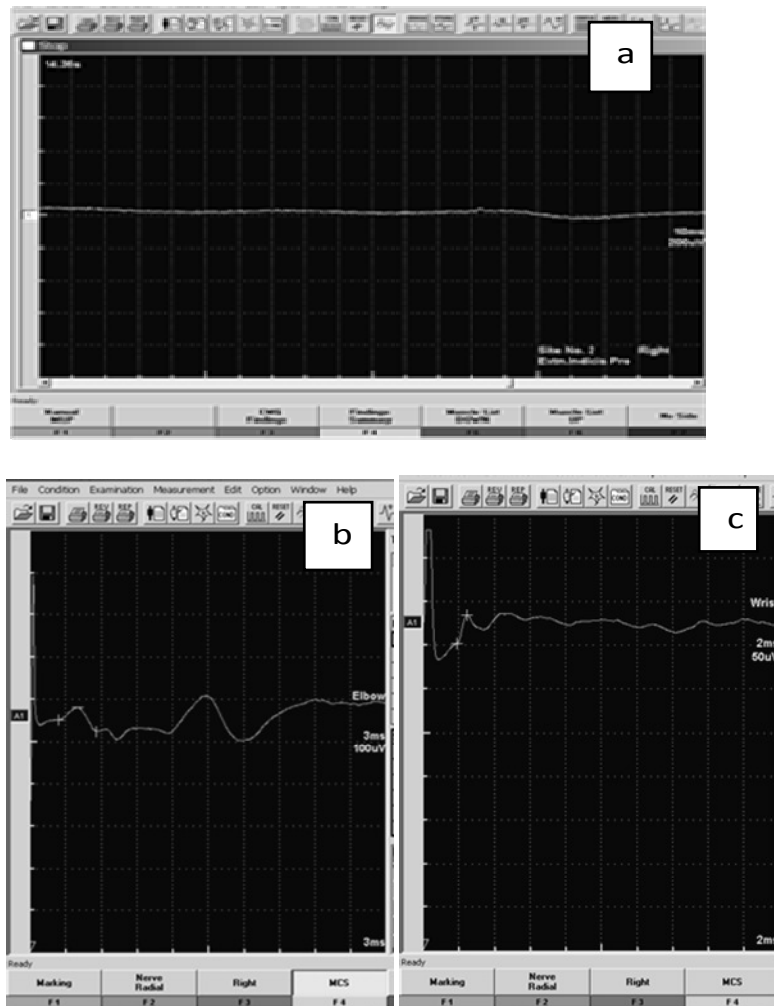


Figure 1. EMG of the right extensor indices muscle showed absent motor unit potentials and absent CMAP (Compound Muscle Action Potential) after stimulation of the right posterior interosseus nerve (a) While nerve conduction studies elicited CMAP from the right brachio-radialis muscle after stimulation of the right radial nerve at elbow (b) with normal SNAP (Sensory Nerve Action Potential) from the right superficial radial nerve (c).

which could be felt on examination.

EMG and nerve conduction's conclusion: Complete lesion of the right posterior interosseus nerve (Figure 1).

Case No. 2: Male patient, 16 years of age presented with limitation of the right hand movements. He had multiple shots to the right hand and forearm.

EMG and nerve conduction's conclusion: Severe lesion of the distal right median nerve below FCR (flexor carpi radialis muscle) innervations.

Case No. 3: Male patient, 28 years of age presented with right foot drop, had multiple shots at the back of the right thigh.

EMG and nerve conduction's conclusion: Mild to moderate lesion of the right peroneal nerve.

Case No. 4: Male patient, 23 years of age presented with right foot drop. He had multiple shots at the back and

front of the right lower limb and buttocks with healed recent burn of the buttocks. Some of the shots were removed surgically and some are still in.

EMG and nerve conduction's conclusion: Right sciatic nerve injury as high as the supply of the right hamstring as well as localized affection of the right knee extensors with no evidence of right femoral nerve affection (Figure 2 and 3).

Case No. 5: Male patient, 21 years of age presented with right foot drop. He had multiple shots to the back of his right lower limb.

EMG and nerve conduction's conclusion: Neurogenic lesion of the right sciatic nerve as high as the innervations of the hamstrings muscle more over the right peroneal nerve.

Case No. 6: Male patient, 19 years of age had multiple

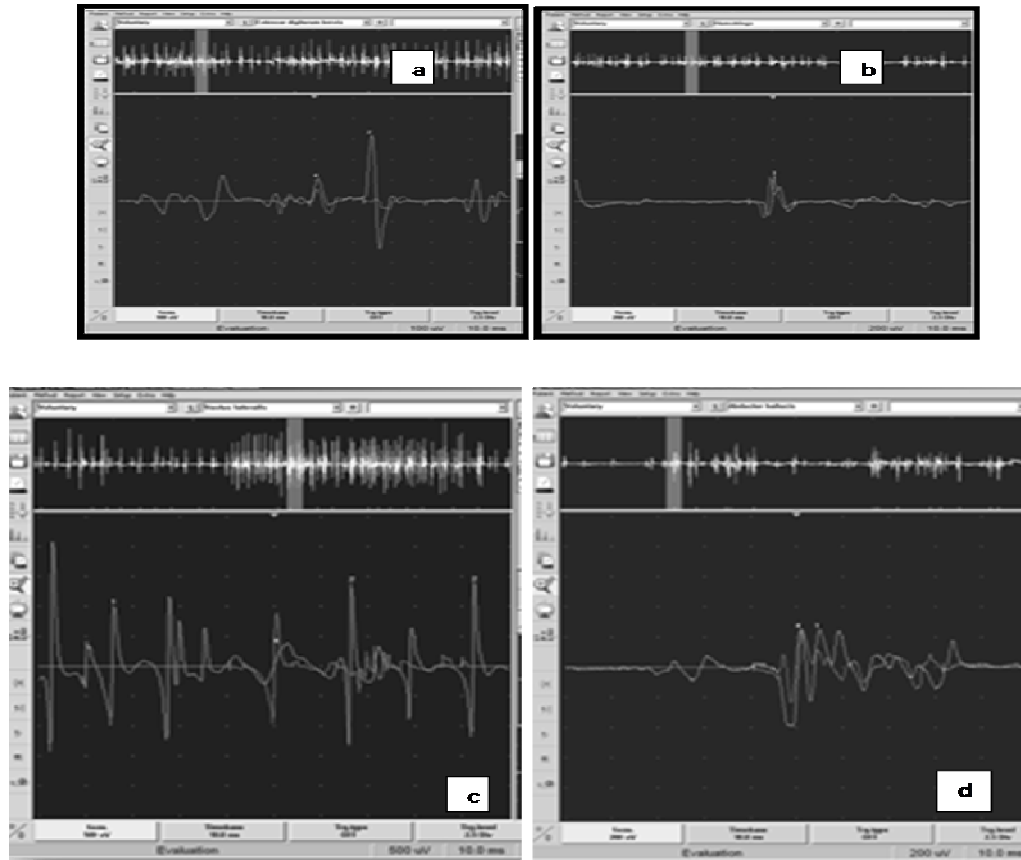


Figure 2. Abnormal polyphasic Motor Unit Potentials (MUPs) from the right Extensor Digitorum Brevis (EDB) (a) Tibialis Anterior (TA) (b) Abductor Hallucis (AH) (c) and hamstrings (d) muscles with moderate reduction of the interference pattern.

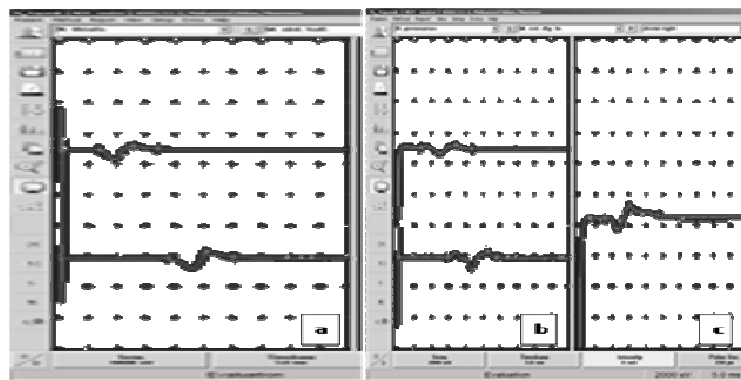


Figure (3): (a) Nerve conduction studies of the right tibial nerve to AH muscle showed delayed DL (6.7 msec), slow conduction velocity (37m/sec) and small amplitude responses (1.1 & 0.3 mV). (b) Nerve conduction studies of the right peroneal nerve to the EDB muscle showed also delayed DL (6.9 msec), slow conduction velocity (39.7m/sec) and small amplitude responses (0.3 & 0.2 mV) as well. (c) Nerve conduction studies of the right peroneal nerve to the TA muscle also showed small amplitude response (1.7 mV) with delayed conduction time (7.9 msec).

shots to the right hand referred for assessment of the distal segment of the right median and ulnar nerves at the

hand. There is clinical and radiological evidence of artero-venous fistula between right ulnar artery and sup-

erficial radial vein. The right median and ulnar nerves had normal sensori-motor studies.

DISCUSSION

The commonest form of pellets' injuries was accidental eye injuries from air gun toys which is called BB toys. These injuries are increasing although they could be fully preventable. Bouhaimed et al (2009) reported 19 children with a mean age of 7.8 years with variable eye injuries during a 7-day Eid el-Fitr holiday festive in Kuwait. Meanwhile Saunte and Saunte (2006) reported 33 cases, with a mean age of 13 years, admitted to one University Emergency Eye Clinic in Copenhagen during a 5-year period between "1998-2002" with a mean age of 13 years.

Holland et al. (2004) identified 16 patients who suffered head and neck injuries with ages ranging from 5 to 15 years. The majority of the cases were violent assaults, which is not in accordance with previous published reports. All of these injuries occurred in public places. Most incidents occurred through the spring and the summer period.

Nerve injuries were not reported as accidental pellet injuries and the only report mentioning them as a complication for airgun shots used in riots control was that of the physicians for human rights (2003).

Gunshots Pellets or what is called "Khartoush" in Egyptian dialect were categorized as non-harmful in comparison to gunshot bullets in the past. However, their status now is changed to less harmful or non-fatal and only when used under certain circumstances.

Air-guns operate at pressures as low as 50 atmospheres which is about pellet numbers. As the cartridge fragmented into several pellets after shooting, it seems to produce multiple enters with some exits and some remain inside the tissue (Shanon and Feldman, 1991). Although multiple, they did not have enough power to produce bone' fractures but may lead to vascular injuries as in case No. 6. No sign of denervation could be recorded in any patient, but small amplitude responses are the clue findings. The pellets had different passage in the tissue leads to multiple injuries. The severity of injuries seems dependent mainly on the distance between the weapon and victim, the nearer the distance the more severe is the injuries. The lower limbs injuries were all from the back and involving the sciatic nerve or one of its branches as the victims were running away from the shots while the forearms' and hands' nerves were injured while facing and trying to protects their face and eyes.

The severity of wounds caused by these weapons rapidly diminishes with increasing the range of fire (Cassidy, 2000). Shotgun wounds created at a distance can be deduced by the widespread pattern of pellet wounds (small circular defects with abraded rims), and

the complete lack of soot staining and powder tattooing or other secondary projectile damage. Unlike exit wounds created by rifled weapons, shotguns do not generally give rise to exit wounds, they remain inside and better left alone as the trial to remove them may lead to extra injuries to the tissues and nerves around them. When the body is struck from a far range, the shotgun pellets do not have enough energy to traverse the body, and particularly they do not have the energy to pierce the skin at the exit site. (Forensic Medicine for Medical Students)

Depending on the type of weapon used, the incidence of nerve damage following pellets gunshots injuries varies between 2%- 100%. Proximal nerve lesions resolve more slowly than distal lesions and multiple or dense nerve lesions have a poorer prognosis than isolated lesions.

Nerve injuries are serious handicapped outcome of pellets gunshots. Therefore, international regulations of using them must be more firm.

ACKNOWLEDGMENTS

For all Kasr Al Aini's staff members who worked under exceptionally stressful circumstances to save their patients' lives either in the real hospitals or in the field hospital.

REFERENCES

- A Report by Physicians for Human Rights (2000). Evaluation of the Use of Force in Israel, Gaza and the West Bank. Medical and Forensic Investigation. November 3. Available at: <http://physiciansforhumanrights.org/library/documents/reports/report-useofforce-israel.pdf>.
- Bouhaimed M, Alwohaib M, Alabdulrazzaq S, Jasem M (2009). Toy gun ocular injuries associated with festive holidays in Kuwait. *Graefes Arch Clin Exp Ophthalmol.*; 247:463-467.
- Cassidy M (2000). Smooth-bore firearm injuries, Chapter 5 In: Mason J.K. and Purdue B.N (Eds) *The Pathology of Trauma*, 3rd Ed Arnold Publishers.
- Forensic medicine for medical students. Available at: <http://www.forensicmed.co.uk>
- Holland P, O'Brien DF, May PL (2004). Should airguns be banned? *Br. J. Neurosurg.*; 18: 124-129.
- Kükner AS, Yilmaz T, Celebi S, Karslioğlu S, Alagöz G, Serin D, Acar MA, Ozveren MF (2010). Characteristics of pellet injuries to the orbit. *Ophthalmologica.*; 224:265-266.
- Morgan JC, Turner CS, Pennell TC (1984). Air gun injuries of the abdomen in children. *Arch Surg.*; 119: 1437-1438.
- Saunte JP, Saunte ME (2006). 33 cases of air soft gun pellet ocular injuries in Copenhagen, Denmark, 1998-2002. *Acta Ophthalmol Scand.*; 84:755-758.
- Sevel D, Atkins AD (1978). Pellet gun injuries of the eye. *S. Afr. Med. J.* 54: 566-568.
- Shanon A, Feldman W (1991). Serious childhood injuries caused by air guns. *Can. Med. Assoc. J.* 144: 723-725.
- Teke Z, Atalay AÖ, Tekin K (2009). Penetrating abdominal wound caused by a close-distance blank cartridge pistol shot: a case report. *Turkish J. Trauma and Emergency Surg.*; 15: 191-193.